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# Tracking Dinosaurs in Scotland

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Neil D L Clark, Hunterian Museum, University of Glasgow, Glasgow, G12 8QQ

## Abstract

Dinosaurs, the Loch Ness Monster not included, are a rarity in Scotland. Although dinosaurs have been known of in England and elsewhere in the world for over 300 years, it was only in the last 23 years that dinosaurs began to appear in Scotland. The first discovery of dinosaur remains on the Isle of Skye was that of a single 49cm long ornithopod footprint discovered in 1982. Since then dinosaur footprints and trackways have turned up in Bathonian rocks of the Middle Jurassic Valtos Sandstone, Duntulm and the Kilmaluag Formations. Dinosaur bones have also been found in rocks of Hettangian, Bajocian and Bathonian age.

A story of broken limbs, helicopters and restricted access due to dangerous rockfalls, dinosaur hunting and tracking is still a dangerous sport in Scotland, not to be undertaken by the faint hearted. The Isle of Skye can be regarded as one of the foremost Middle Jurassic sites for dinosaur remains worldwide and continues to reveal its world-record-breaking secrets more and more, every year.



Figure 1. Map of Scotland and Skye

## Introduction

Dinosaur fossils of any kind are rare in Scotland. Apart from a dubious record of a single track of a small saurischian dinosaur from Caithness (Sarjeant 1974), and *Saltopus elginensis*, a possible dinosaur, or dinosaur precursor, from the Triassic rocks of Morayshire (Benton 1997), only sediments on the foreshore around the coast of the Trotternish Peninsula, Isle of Skye have produced numerous bones and footprints of dinosaurs (Figure 1).

The first evidence of a true dinosaur to be found in Scotland was a large footprint discovered on a loose block of muddy limestone from the Lonfearn Member of the Lealt Shale Formation at Rubha nam Brathairean in 1982. This footprint, although originally interpreted as having been produced by a theropod dinosaur, is now thought to belong to an ornithopod (Andrews & Hudson 1984; Delair & Sarjeant 1985). Since then, dinosaur footprints and trackways have been found in the Valtos Sandstone Formation (Bathonian) near Staffin at Dun Dearg and Kilt Rock (Clark & Barco Rodriguez 1998; Clark 2001a), the Duntulm Formation (Bathonian) near Staffin at An Corran (Clark *et al.* 2004), and the Kilmaluag Formation at Score Bay (Clark *et al.* 2005) (Figure 2).

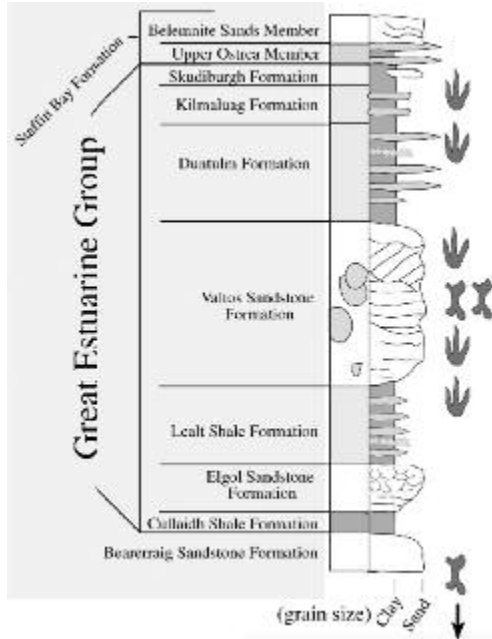


Figure 2. Stratigraphy of the Middle Jurassic Great Estuarine Group on the Isle of Skye showing the distribution of dinosaur footprints and bones.

Dinosaur bones are also known from Scotland. A theropod tibia was found in the Broadford Beds Formation (Hettangian) in the Strathaird Peninsula, southern Isle of Skye (Benton *et al.* 1995), a thyreophoran ulna and radius came from the Bearerraig Sandstone Formation (Bajocian) at Bearerraig Bay, northern Isle of Skye (Clark 2001b), and cetiosaur bones and a coelophysid-like tail bone were discovered in the Valtos Sandstone Formation at Dun Dearg near Staffin (Clark *et al.* 1995, Clark *et al.* 2004, Liston 2004).

## Loch Ness Monster

Most people now believe that the Loch Ness Monster is not a dinosaur although there are still a few who cling to the idea of it being a plesiosaur. What it is, exactly, remains controversial, but it is unlikely to be a resident air breathing giant marine reptile or there would be a substantially greater number of sightings. Saint Adomnàn related the first report of the monster in the 7th century (Sharpe 1995) as he told of the story of Saint Columba's travels and miracles. In about the year 565, Saint Columba sent the monster fleeing by commanding it to leave in God's name thus saving a man the monster was about to attack. Saint Adomnàn wrote this over 100 years after the event and, I believe, may have had his stories mixed. In the chapter previous to the encounter with the monster of Loch Ness, Saint Adomnàn mentions the travels of Saint Columba on the Isle of Skye. Perhaps what Saint Columba was banishing to the sea was a Jurassic plesiosaur, or ichthyosaur dug up in Skye? This is pure conjecture and does not explain the many sightings since 1933 when the A82 trunk road was completed along the west of Loch Ness.

So, what is *Nessiteras rhombopteryx*, the Loch Ness Monster (Anon 1975, Scott & Rines 1975)? Well, as Nicholas Fairbairn pointed out, the pseudo-scientific name for it is an anagram of "Monster hoax by Sir Peter S.". Scott's name for the monster is pseudo-scientific because it does not follow the rules of the code for zoological nomenclature for naming new animals. We cannot be certain that all the sightings are of the same phenomenon, nor do we have any physical remains in any national repository with which to compare this phenomenon with any other. All we

have are eyewitness accounts, fuzzy photographs, distant video footage and a host of proven hoaxes.

Many of the sightings have been explained as floating logs or freak waves, but there are still quite a number of unexplained sightings. Another possible explanation for some of the early sightings that may be explored further concerns travelling circuses. Circus fairs visiting Inverness would have stopped on the banks of Loch Ness to allow their animals to rest. If the elephants were allowed to swim in the loch, only the trunk and two humps would be seen: the first hump being the top of the head and the second being the back of the animal. The resulting impression would be of an animal with a long neck and two humps – more if there were more than one elephant in the water. It is not surprising that the circus owner Bertram Mills offered a £20,000 reward to anyone who could capture the monster for his circus, because it was likely that he already had one in his circus – perhaps the Loch Ness Monster itself! It is therefore not surprising that no-one has yet claimed the reward!



Figure 3. Interpretation of a swimming elephant with a darker Loch Ness Monster profile above the water line.

Since the discovery of the first dinosaur track in 1982 in the Lonfearn Member of the Lealt Shale Formation (Bathonian, Middle Jurassic), it was not until about ten years later that the next discovery was made. A Mr Lachlan Scott-Moncrieff of Staffin gave a small fragment of an unidentifiable dinosaur bone to Mr Dugald Ross of the Staffin Museum, Isle of Skye. It was not identified as being part of a dinosaur bone until 2001 when it was first shown to me. This bone appears to have been found before other discoveries reported in the press in 1995 and before 1992.

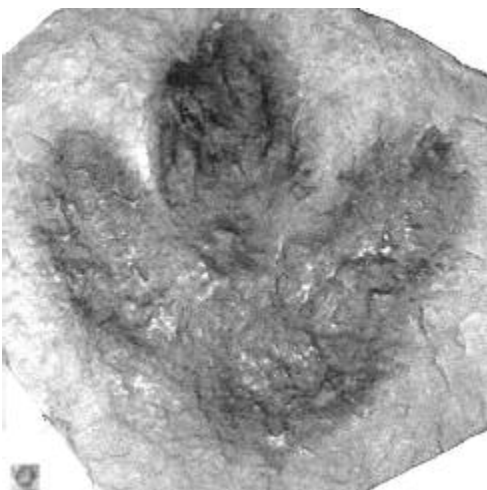


Figure 4. The Lealt Shale Formation footprint showing rounded toe impressions (X0.15).

Two dinosaur bones were reported in 1995 that come from opposing ends of the Isle of Skye. A small bone in the collections of the National Museums of Scotland, Edinburgh, was found in 1992

by a German collector (Matthias Metz) in rocks of the Upper Broadford Beds (Sinemurian, early Jurassic) from southern Strath and is likely to be the tibia of a ceratosaurian dinosaur similar to *Coelophysis* or *Dilophosaurus* (Lower Jurassic North American dinosaurs). This bone is approximately 127mm long (Benton *et al.* 1995). The other reported bone (Clark *et al.* 1995) has a reconstructed length of about 900mm and is thought to be a limb bone of the sauropod *Cetiosaurus* (a Middle Jurassic European and North African dinosaur).

### **Dougie the Dinosaur**

The sauropod bone is from rocks of the Valtos Sandstone Formation (Bathonian, Middle Jurassic) of the Trotternish Peninsula in the northern part of the Isle of Skye. An unknown collector, who returned it anonymously to be reunited with the rest of the bone, had removed the mid-shaft. Chris Mitchell and Jan Wolfe of Staffin (now of Seil Island) found and collected the distal end separately. The proximal end was found by Drs Doug Boyd and John Dixon of BP Exploration and reported to Dugald Ross of the Staffin Museum. The dinosaur became affectionately known as 'Dougie the Dinosaur', being named after both Dugald Ross and Doug Boyd. The limb bone can now be seen in the collections of the Staffin Museum (Clark *et al.* 1995; Liston 2004). There is some dispute as to which limb the bone belongs to.

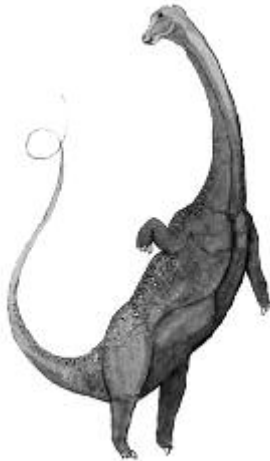


Figure 5. Impression of the reconstructed cetiosaur 'Dougie the Dinosaur'.

Originally thought to be either a tibia or femur, it is now considered more likely to be a bone of an anterior limb (Liston 2004).

### **More tracks, a big break and more bones**

In January 1996, a series of footprints of small dinosaurs was discovered in rocks of the Valtos Sandstone Formation. One footprint type was probably produced by a small ornithomimid and the other was probably that of a small theropod. Whilst attempting to collect the footprints, I suffered an injury that nearly cost me my right leg. I broke my leg, presumably as a result of a stress fracture resulting from the use of power tools, and was airlifted to Stornoway, Isle of Lewis. As the leg was not secured properly the airflow from the helicopter rotaries caused the lower part of the leg to flap wildly inducing greater damage. The other members of the team were left to recover the broken blocks containing the dinosaur footprints that are now in the collections of the Hunterian Museum (Clark 2001a).

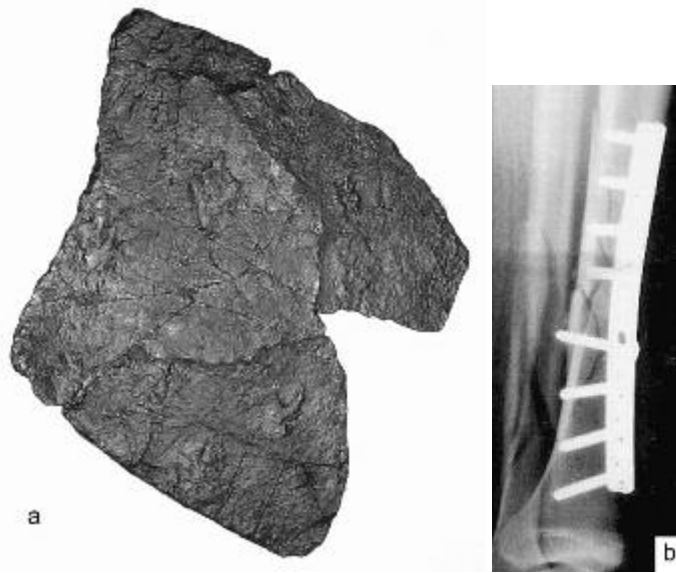


Figure 6. a, Dinosaur footprints from the winter 1996 discovery at Rubha nam Brathairean (X0.05); b, X-ray of my leg after it was put back together (X0.25).

Also in 1996, another caudal vertebra was found. This one was much larger than the previous one and was found by David Morgan and Dugald Ross near Staffin. Although reported in the press as being from the tail of a large theropod, it is actually from the tail of a sauropod akin to *Cetiosaurus*. Several other bones have been found from the same formation (Valtos Sandstone Formation) although most of these are unidentifiable except in the broadest possible terms such as 'dinosaur ribs' and '?dinosaur bones' (Clark *et al.* 2004).



Figure 7. Cetiosaur tail bone from north of Kilt Rock near Staffin, found by Dugald Ross and David Morgan.

### ***In situ* at An Corran**

The discovery in early 2002 of a footprint on the foreshore at An Corran by Cathie Booth whilst walking her dog, near the Staffin slipway led Dugald Ross, Paul Booth and myself to the first *in situ* dinosaur remains from Scotland. These footprints, numbering over 15, contain some of the largest footprints yet found on Skye at over 530mm in length. The footprints are from the Duntulm

Formation (Bathonian, Middle Jurassic) (Clark *et al.* 2004) and are easily accessible at low tide during the winter months.



Figure 8. Large *in situ* theropod dinosaur footprints at An Corran.

During the summer months, however, the footprints are usually covered by a thick layer of shifting sands (Clark 2003).

## World Breakers

### The earliest thyreophoran and the tiniest dinosaur footprint

In 1997, Colin Aitken of Edinburgh found another set of bones. These were found in rocks from the Bearreraig Sandstone Formation (Early Bajocian, Middle Jurassic) and were a partial ulna and a partial radius of a thyreophoran dinosaur related to either stegosaurs or ankylosaurs. In a similar manner to the first sauropod limb bone, the bone found by Mr Aitken was subsequently collected by an unknown visitor. This unknown person broke the rock containing the bone and removed leaving a pile of rubble and removing the bone (probably the humerus). Dugald Ross collected the rubble and found it to contain the ulna and radius bones of the thyreophoran dinosaur. At least some of the bones of what may be the earliest ankylosaur remains have been rescued for science from obscurity into the collections of the Staffin Museum (Clark 2001b). It would be a bonus if the missing bone, possibly the humerus, were to be reunited with the ulna and radius of such an important dinosaur.

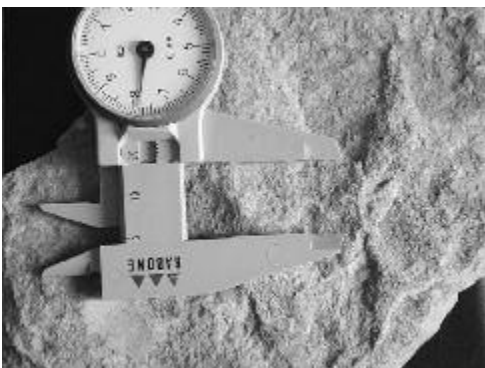


Figure 9. The World's smallest dinosaur footprint from Lub Score (X0.65).

In late 2002, dinosaur footprints were discovered on loose blocks of sandstone, as well as *in situ*, on the foreshore at Lub Score, northwest Trotternish Peninsula, Isle of Skye. The majority of these footprints were much smaller than any previously found in Scotland at about 7-8cm long,

and were closely associated with larger footprints of what seems likely to be the same species of about 25cm long. These footprints are stratigraphically younger than any other dinosaur remains found in Scotland to date. Some of these footprints represent the trackways of young theropod dinosaurs sometimes associated with those of an adult. It has been postulated that these may represent the first ever evidence of a theropod family group. The World's smallest dinosaur footprints, measuring 1.8cm long were also found from these rocks (Clark *et al.* 2005) and will be featured in this year's Guinness Book of World Records.

### **The youngest coelophysid**

Also in 1995, a small tailbone found in the vicinity of the sauropod bone was found. It turns out that this bone is probably from the tail of another small ceratosaurian dinosaur similar to *Coelophysis* (a Lower Jurassic North American dinosaur). This bone can be seen in the collections of the Hunterian Museum (Clark *et al.* 2004; 2005).



Figure 10. Coelophysid-like tail bone from the Valtos Sandstone Formation (X2).

### **In Memory of Millie**

Millie the Dinosaur was not a real dinosaur, although she became real to a great number of dinosaur enthusiasts in Scotland, and was dismantled in the grounds of the University of Glasgow on Saturday 21st May 2005. The reconstructed rendition of a *Tyrannosaurus rex* was popular with visitors, students, and palaeontologists from around the World, but the university could not afford to keep repairing the imposing artwork that was costing in excess of £2,000 a year. Millie was a sculpture of great value both as a work of art and as a scientific representation based on current knowledge of a dinosaur. During the week prior to being demolished, about 720 students past and present from the University of Glasgow, as well as admirers from all over the World, pledged their support by signing an online petition set up by an anonymous group of concerned students, after hearing a rumour that the University was planning to move Millie.

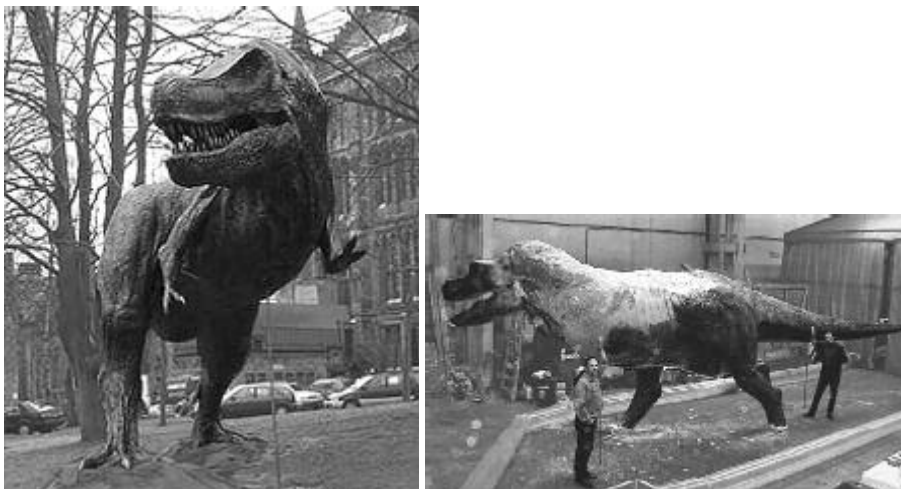


Figure 11. a, Millie the *Tyrannosaurus rex* at the University of Glasgow; b, Millie partly complete.



Millie was originally installed in 2001 as part of the BBC's Walking With Dinosaurs exhibition, held in the Hunterian Museum. Millie, the largest replica *Tyrannosaurus rex* in the World, was only meant to stay for three months to promote the exhibition, but lasted for over 3 years. As one of the last of the Scottish dinosaurs, and probably one of the most popular, it is sad to reflect on her extinction.

### What the future holds

The Isle of Skye continues to bear dinosaurian fruits. On average, about one discovery is made each year, and nearly every discovery is of something different and new to Scotland. This means, at the current rate, that it will take over 200 years to collect a complete dinosaur. There is still much to be discovered and learned from dinosaurs on the Isle of Skye. My hope is that material that has disappeared from Scotland's Dinosaur Isle will eventually be made available for research, and that collecting on behalf of the Scottish museums continues to reap rewards, as it has done over the last 10 years.



Figure 12. A selection of dinosaur types represented on the Isle of Skye (approximately X0.015).

One interesting aspect of the research into the dinosaurs from Scotland is that the dinosaurs have more in common with North American dinosaurs at that time than with Europe and Africa. This is not the whole story as there are also similarities with Middle Jurassic remains from elsewhere in the UK and Europe (Clark *et al.* 2004, 2005). Perhaps Scotland represented a refugium for Lower Jurassic North American dinosaurs such as *Coelophysis*? Not having any body fossils from the Middle Jurassic of North America makes it difficult to draw too many conclusions as yet, but more discoveries are being made each year in North America and it may just be a matter of time before they find their first Middle Jurassic dinosaur bones.

### Acknowledgements

Tooth and Claw model makers Joe Cherrie, John Riddell and Kate Nelson for producing Millie the Dinosaur. Jeff Liston for the Millie concept. Thanks to all those who have contributed to the discovery of dinosaurs in Scotland from Research Scientists to Winklers. Thanks also are especially due to Dugie Ross, Paul and Cathie Booth, Chris Mitchell, Jan Wolfe, David Morgan, Colin Aitken, Colin MacFadyen, Stephen Varwell, Jim Rennie and all the anonymous collectors, researchers and facilitators from around the World. Clare Clark is thanked for pointing out the possibility of the Loch Ness Monster circus connection.

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